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BIG GAME FISHING IN THE NORTHERN GULF OF MEXICO DURING 1978.

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U.S. DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL MARINE FISHERIES SERVICE

SOUTHEAST FISHERIES CENTER

PANAMA CITY, FLORIDA

JULY 1979

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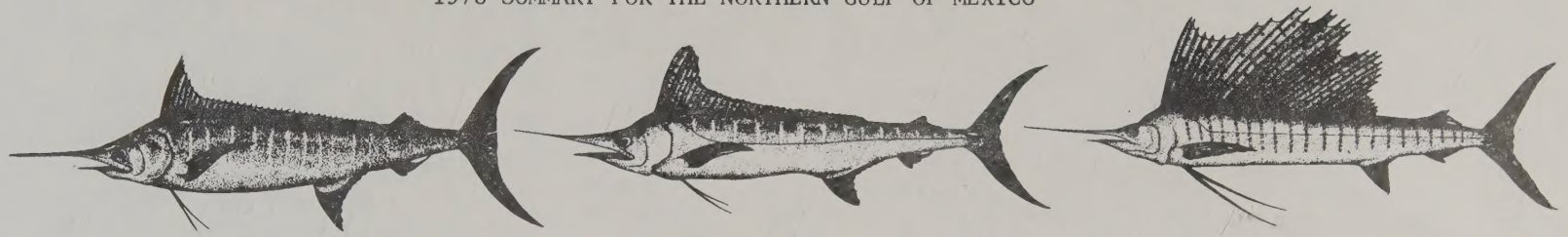
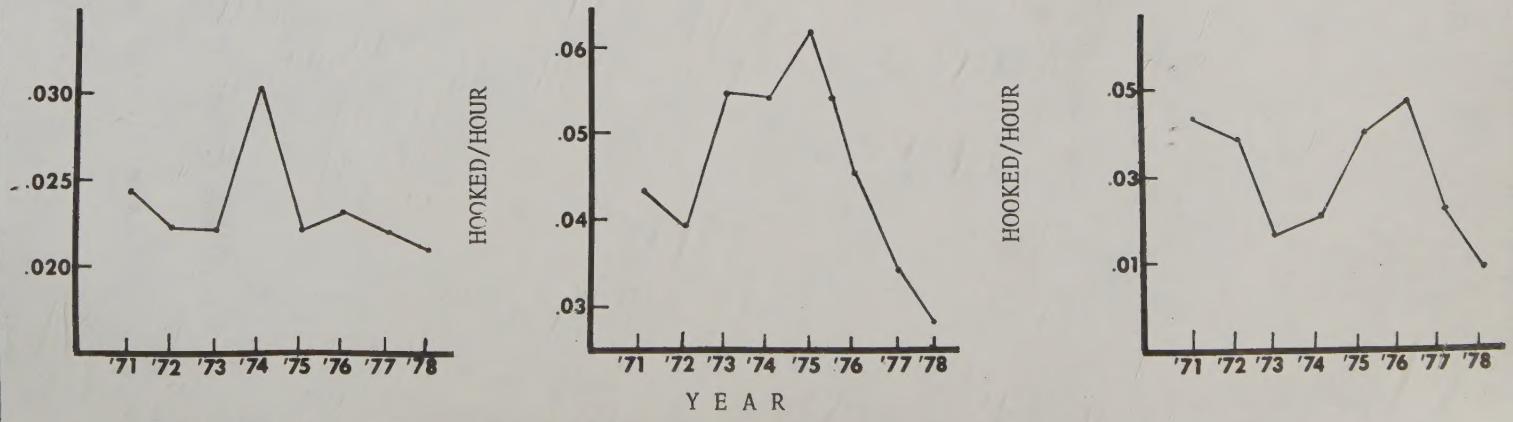
1978 SUMMARY FOR THE NORTHERN GULF OF MEXICO



	BLUE MARLIN	WHITE MARLIN	SAILFISH
Peak fishing month	September	November	September
Size range (pounds)	55.5 - 699.0	25.0 - 113.3	2.0 - 84.0
Sex ratio (M:F)	1:4.4	1:1.9	1:2.6

Relative abundance



INTRODUCTION

Prior to the mid-1950s, the potential for big game fishing in the Gulf of Mexico received little, if any, recognition. During the mid-1950s, exploratory fishing in the Gulf by the U.S. Fish and Wildlife Service resulted in impressive catches of blue marlin and white marlin. Shortly thereafter, a sport fishery for these fishes began off the Mississippi River delta, and the popularity of big game fishing expanded in the ensuing years throughout the northern Gulf of Mexico.

To learn about the resource and the recreational fishery in the Gulf, the National Marine Fisheries Service began a study of big game fishes in 1970 from their Panama City, Florida laboratory. In 1972, this study was incorporated into the Oceanic Game Fish Investigations of the Southeast Fisheries Center, headquartered in Miami, Florida. The goals of these investigations are to assess the status of stocks of billfishes, to determine their distribution and abundance, and to obtain information on their biology and ecology.

This is the eighth annual report on the results of analyses of big game fishing in the northern Gulf of Mexico. It presents information on relative abundance, distribution, fishing success, and limited biological data for the year 1978. Comments regarding this report can be sent to the address on the cover.

SURVEY DATA

During the 1978 fishing season, the Oceanic Game Fish Investigations had seasonal port samplers at Port Aransas, Texas (northwestern Gulf); Grand Isle and South Pass, Louisiana (northcentral Gulf); and Pensacola, Destin, and Panama City, Florida (northeastern Gulf). The samplers obtained data from boat captains, members of big game fishing clubs and charter boat associations, and other anglers. The types of data included: catch and effort; weather conditions; fishing areas; fishing activities by time of day; number of fish raised, hooked, and boated/released; and information on catches (species, length, weight, and sex). These data were then used in making yearly comparisons of catch and effort, and in determining relative abundance indices, and biological and behavioral characteristics of big game fishes.

Fishing effort consisted of hours spent trolling for blue marlin (Makaira nigricans), white marlin (Tetrapturus albidus), and sailfish (Istiophorus platypterus). Driftfishing activity for swordfish (Xiphias gladius) is not included in analyses made in this study. However, because our port samplers documented driftfishing activity whenever possible, these data are presented in Table 1a as a supplement to the trolling activity reported in Table 1.

CATCH AND EFFORT

The amount of time fished, the resultant catches (includes releases), catch-per-hour (CPH) and its reciprocal were summarized for the entire year (Table 1). The amount of sampled fishing effort (31,342.9 hr) was 6,855.9 hr, (28%) more than that sampled in 1977. Recorded fishing effort in 1978 increased over the previous season at every port except Panama City. By port, the increases in sampled effort were: Destin, 29%; Pensacola, 57%; Orange Beach, 20%; South Pass, 21%; Grand Isle, 71%; and Port Aransas, 20%. Billfishing effort recorded from Panama City decreased 31%. As in most past seasons, Destin was apparently the busiest billfishing port, accounting for 23% of the total effort.

In spite of the record number of billfishing hours recorded in 1978, this was the first season since 1974 that the recorded catch totaled less than 1,000 fishes. Of the total catch of 956 billfishes, 18 blue marlin, 84 white marlin, and 14 sailfish were released.

The CPH decreased at five of the seven ports. Compared to the 1977 season, CPH decreased 31% at Panama City, 41% at Destin, 56% at Pensacola, 16% at South Pass, and 15% at Port Aransas. The CPH increased 2% at Orange Beach and 20% at Grand Isle. For the entire northern Gulf of Mexico, the CPH decreased 33%.

From 1971 to 1978, the CPH for each of the three species and all species combined is shown in Figure 1. The CPH of blue marlin (0.009) was the same in 1977 and 1978 and, of the three species, has fluctuated least. The catch rate of white marlin (0.016) declined for the third consecutive year and equalled the low recorded in 1972. The CPH of sailfish (0.006) decreased 65% from the previous season and was the lowest ever recorded in this study. For all billfishes, the CPH (0.031) was also the lowest for the period covered by this study and was 47% below the average of the previous 7 years.

A considerable number of hours (576 hr) of driftfishing for swordfish was documented this season and is shown, by port, in Table 1a. The highest CPH of swordfish (0.113) and for all species combined (0.125) was recorded from Panama City. The CPH of swordfish for all areas (0.068) while driftfishing was 4.25 times greater than the highest catch of any single species (0.016 for white marlin) while trolling.

SIZE COMPOSITION

The size (weight) composition of the catch of blue marlin, white marlin, and sailfish was summarized by port and for the entire northern Gulf (Table 2). The largest blue marlin (699.0 lb) was landed at Grand Isle. A 688.5-lb blue marlin at Panama City was the largest fish of this species we have recorded for the northeastern Gulf. Both the largest (113.3 lb) and smallest (25.0 lb) white marlin were landed at Destin. The 113.3-lb fish was the largest white marlin we have recorded for the entire northern Gulf area. The largest (84.0 lb) and smallest (2.0 lb) sailfish were also reported from Destin.

Average weights for each species were calculated from 1971 to 1978 (Fig. 2). For blue marlin, the average weight decreased from a high of 272 lb in 1977 to 261 lb but remained above the previous 7-yr average of 250 lb. The overall decrease from 1977 in the average weight of blue marlin was reflected in all three areas: the average in the northeastern Gulf decreased slightly from 248 lb to 243 lb; the average in the northcentral Gulf also decreased slightly from 309 lb to 298 lb; the average in the northwestern Gulf decreased about 10%, from 252 lb to 229 lb. As in past seasons, the average weight of blue marlin landed in the northcentral area was considerably higher than the averages in the other two areas. The average weight of white marlin increased from 53 lb to 55 lb between 1977 and 1978. Of the three species, the yearly average weights of white marlin varied the least from an overall average of 54 lb. The average weight of sailfish was 43 lb, a weight equal to the 7-yr average from 1971 to 1977. No apparent increasing or decreasing trends in the average weights of billfishes taken in this fishery were discernible for any of the three species.

The percentages of three size groups of blue marlin were determined for each year from 1971 to 1978 (Fig. 3). The size groups were arbitrarily chosen as follows: small fishing weighing 110 lb or less, medium fish weighing 111 to 399 lb, and large fish weighing 400 lb or more. Of the total number weighed each year, the percentage of small blue marlin in the 1978 catches was second only to the percentage of small fish in 1971. An interesting relationship between the percentages of small and medium fish has occurred from 1975 to 1978. During this time, the percentage of small fish increased yearly going from 0% to 10%, while the percentage of medium fish in the catch continuously decreased from 88% to 75%. In 1978, the percentage of large blue marlin in the catch was higher than any previous year, rising almost steadily during the past three seasons.

SEX COMPOSITION

The sex ratios of each species were determined again in 1978 (Table 3). Female blue marlin outnumbered males by a greater proportion (4.4:1) than during any previous year. At three locations (Destin, South Pass, and Port Aransas), 9+ females were found for every male. Of particular interest is the dissimilarity between the sex ratios of blue marlin landed at South Pass and those landed at Grand Isle, two relatively adjacent areas. In Destin and Pensacola, which are also relatively close to each other, females were predominant in the sample at the former port and males predominant at the latter port. For the second consecutive year, the female to male ratio of white marlin remained nearly equal with less than two females caught for every male. This was the third time since 1970 that the female to male ratio of white marlin was less than 2:1. The 1978 female to male ratio for sailfish of 2.6:1 was the largest ratio we have on record. Of interest is the predominance of females in the catch composition whenever the CPH of sailfish is low. In 1973 and 1978, when the CPH for this species was lowest, female sailfish outnumbered males by more than 2:1. Conversely, in 1976 when we measured a record high CPH of sailfish, the female to male ratio was the lowest (1.2:1). However, females have always been dominant in the catches but

place are marked in heavy black outline, with blank squares indicating no fish raised.

Northeastern Gulf

For the first time since this study began in 1971, we recorded fishing activity south of 29°N latitude in the northeastern Gulf, even though the magnitude of fishing effort was less than 25 hr per square. The area fished in 1978 increased by 27% over 1977 (65 vs. 51 squares). Blue marlin were raised in 60% (39 squares) of the area fished (Chart 1) and were, generally, more abundant closer to shore than in previous seasons. During the season, an area due south of Orange Beach, referred to as "The Steps," produced the highest number of blue marlin raised-per-hour-of-trolling. White marlin were recorded in 75% (51 squares) of the area fished (Chart 2) and were, generally, raised most frequently from about the 100-fath curve and beyond. White marlin were raised in all three of the squares fished south of 29°N latitude. Highest concentrations occurred in the area between 29°00' and 29°30'N. Sailfish were raised in 68% (44 squares) of the fishing area (Chart 3) and in one of the three squares south of 29°N latitude. The fish appeared to be concentrated closer to shore than last year, as the two areas of high concentrations were inshore of the 50-fath curve. Fishermen raised billfishes in 89% (58 squares) of the area they fished (Chart 4). Though this is a 5% decrease compared to 1977, when billfishes were raised in 94% of the area fished, the expanded fishing area in 1978 resulted in billfishes being raised in an area larger by 10 additional squares.

Northcentral Gulf

In the northcentral Gulf, the fishing area (Charts 5-8) increased by 9 squares, or 16%, over the area fished in 1977. Fishing reports indicated there was some shift in fishing out of South Pass to east of 88°W longitude that is, in "The Steps" area mentioned above. Blue marlin were raised in 82% (55 squares) of the fishing area (Chart 5) compared to 67% (39 squares) during the previous season. Their distribution was similar to last season's in that areas of mid and high concentrations were, generally, from about the 200-fath curve seaward. Fishermen raised white marlin in 70% (47 squares) of the area fished (Chart 6). Generally, the areas with mid and high numbers of fish raised-per-hour were more numerous and closer inshore than during the 1977 season. Sailfish were so scarce that they were reported to have been raised in only 9 (12%) squares of the 67 that were fished (Chart 7), as compared to 12 (21%) of the 58 squares fished in 1977. Another contrast is that sailfish were most abundant offshore (square L40) in 1978 and inshore (square L34) in 1977. Billfishes were raised in over 91% (61 squares) of the area fished (Chart 8) in 1978 compared to 78% (45 squares) of the 1977 fishing area.

Northwestern Gulf

In the northwestern Gulf, inadequate sampling resulted in incomplete coverage of fishing areas. Fishing was reported from 54 squares compared to 69 squares the previous season. Fishermen reported raising blue marlin

in 57% (31 squares) of the fishing area (Chart 9), with relatively high concentrations between the 100 and 300-fath line. White marlin were raised in 30% (16 squares) of the reported area, as compared to 32% (22 squares) of the 1977 fishing grounds. Sailfish were reportedly raised in 59% (32 squares) of the fishing area (Chart 11), versus 64% (44 squares) of the 1977 area, and were most widely distributed of the three species. For all combined species, billfishes were raised in 87% (47 squares) of the area fished (Chart 12), compared to 80% (55 squares) of the 1977 fishing area. With one exception (square T94), the area of maximum number of fish raised-per-hour were between the 100 and 300-fath curve.

RELATED OVSERVATIONS

Additional information that resulted from the study follow:

1. A 45.8-lb fish that might be a specimen of the purported "hatchet marlin," Tetrapturus sp., was caught by Wayne Affolter of Rio Hondo, Texas, during the Port Mansfield (Chamber of Commerce) Fishing Tournament. The fish was initially identified as a white marlin but, upon close observation, was noted to have (1) truncated dorsal and anal fins, and (2) no purple blotches in the upper portion of the dorsal fin. These are two of the three characteristics that have been reported for the "hatchet marlin." The fish, however, did lack the rounded scales that the "hatchet marlin" is believed to possess.

Another specimen that might be a "hatchet marlin" was brought into Destin, Florida, on September 10, 1978 aboard the MISS LISA. The fish, tentatively identified as a white marlin, weighed 44.5 lb and will be re-examined for more accurate identification.

2. Catches of eight spearfish, Tetrapturus pfluegeri, were recorded this season. By port, they were: Panama City, 1 boated and 1 released; Destin, 1 boated; Mobile, 1 boated and 1 released; South Pass, 2 boated; and Texas, 1 boated.

3. Yellowfin tuna, Thunnus albacares, are commonly caught in the northcentral Gulf but are relatively scarce in the other two areas, although catches of yellowfin tuna in the northeastern Gulf in 1977 were fairly good. This season, however, the CPUE in that area declined substantially. In the northeastern Gulf 59 fish were recorded as boated or released in 1977 compared to 23 this season. By port, the catches were: Panama City, 2 boated; Destin, 6 boated and 1 released; Pensacola, 3 boated; and Mobile, 11 boated. In the northwestern Gulf, 6 yellowfin tuna were recorded as caught compared to 17 in 1977.

ACKNOWLEDGMENTS

I am grateful for the cooperation given by the anglers, charter boatmen, and officers of sport fishing groups: Organizers of the Texas Championship Billfish Tournament, and the Boatman's Association, Port Aransas; Jesse and

Jacquie Edmundson, Freeport; Russ Wilhour, Key Allegro; Walter Fondren, Port O'Conner; Organizers of the Texas International Fishing Tournament, Port Isabel; Ed Parsons, Port Mansfield; Russel and Betty Cheramie, the Golden Meadow Big Game Fishing Club; Herman "Dutch" Prager, Jr., and Maumus F. Claverie, Jr., the New Orleans Big Game Fishing Club; William Myers, the Baton Rouge Big Game Fishing Club; Larry Johnson, the Mobile Big Game Fishing Club; Earl Owens, the Pensacola Big Game Fishing Club; Si Howard, the Fort Walton Beach Sailfish Club; Kelly Windes and Joy Dunlap, the Destin Charter Boat Association; and Don Morrell, the Panama City Fishing Association.

The record 31,343 hr of fishing data was collected by our port samplers conducting about 4,145 interviews. I thank Russell Vetter and Steven McDanel, Port Aransas; Myron Fischer, Grand Isle; Joe Yurt, South Pass; John Wright and Dale Drysdale, Pensacola; and Karen Brockman, Destin, for their outstanding work throughout the season.

I express my gratitude to the following people whose services helped expedite this report: Rita Bloechel, Panama City Laboratory, for the preparation of text; and Dorothy Latady, Pascagoula Laboratory, for the printing of this report.

My special thanks go to Donna S. Parker, YACC member, Panama City Laboratory, whose help and dedication was very much appreciated.

Table 1.--Summary of big game fishing recorded in the northern Gulf of Mexico, 1978.

	Panama City	Destin	Pensacola	Orange Beach	South Pass	Grand Isle	Port Aransas	All Areas Combined
Total Hr. fished	1,093.4	7,087.6	3,452.5	2,439.7	6,678.8	4,555.0	6,035.9	31,342.9
Number of recorded catches*								
Blue marlin	8	52	18	37	66	28	62	271
White marlin	51	222	36	69	72	23	27	500
Sailfish	10	72	11	8	5	2	77	185
All billfishes	69	346	65	114	143	53	166	956
Catch-per-hour								
Blue marlin	0.007	0.007	0.005	0.015	0.010	0.006	0.010	0.009
White marlin	0.047	0.031	0.010	0.028	0.011	0.005	0.004	0.016
Sailfish	0.009	0.010	0.003	0.003	0.001	0.000	0.013	0.006
All billfishes	0.063	0.049	0.019	0.047	0.021	0.012	0.028	0.031
Hours trolled to catch a								
Blue marlin	136.7	136.3	191.8	65.9	101.2	162.7	97.4	115.7
White marlin	21.4	31.9	95.9	35.4	92.8	198.0	223.6	62.7
Sailfish	109.3	98.4	313.9	305.0	1,335.8	2,277.5	78.4	169.4
All billfishes	15.8	20.5	53.1	21.4	46.7	85.9	36.4	32.8

Table 1a.--Summary of recorded driftfishing for big game fish in the northern Gulf of Mexico, 1978.

	Panama City	Destin	Pensacola	Orange Beach	South Pass	Grand Isle	Port Aransas	All Areas Combined
Total Hr. fished	167.5	195.7	21.0	18.5	60.7	44.5	68.0	575.9
Number of recorded catches								
Swordfish	19(.113)	13(.066)	1(.048)	0	0	1(.022)	5(.074)	39(.068)
Blue marlin	1(.006)	0	0	0	0	0	0	1(.002)
White marlin	0	1(.005)	0	0	0	1(.022)	0	2(.003)
Sailfish	1(.006)	0	1(.048)	0	0	0	0	2(.003)
All billfishes	21(.125)	14(.072)	2(.095)	0	0	2(.045)	5(.074)	44(.076)

* Includes releases

Table 2.--Weights (pounds) of billfishes recorded in the northern Gulf of Mexico, 1978.

	Panama City	Destin	Pensacola	Orange Beach	South Pass	Grand Isle	Port Aransas	All Areas Combined
Blue marlin								
Largest	688.5	599.8	348.5	489.5	589.4	699.0	560.0	699.0
Smallest	95.0	88.3	59.7	93.5	59.8	66.0	55.5	55.5
Average	271.2	245.0	189.5	265.3	318.6	251.7	231.6	260.6
White marlin								
Largest	78.0	113.3	84.0	75.8	83.0	101.0	85.0	113.3
Smallest	35.0	25.0	41.5	37.5	33.5	39.8	41.0	25.0
Average	54.3	54.4	55.1	50.2	55.7	58.7	58.9	54.7
Sailfish								
Largest	56.0	84.0	59.5	46.3	51.9	52.0	75.0	84.0
Smallest	35.5	2.0	31.3	7.5	34.2	52.0	6.5	2.0
Average	46.9	33.5	47.2	31.5	40.4	52.0	48.7	43.4

Table 3.--Sex ratios of examined billfishes caught in the northern Gulf of Mexico, 1978 (M = Males; F = Females)

	Panama City	Destin	Pensacola	Orange Beach	South Pass	Grand Isle	Port Aransas	All Areas Combined
Blue marlin								
No. of M:no. of F	0:4	3:28	7:2	4:4	5:48	9:17	4:39	32:142
No. of M per one F	0	0.1:1	3.5:1	1.0:1	0.1:1	0.5:1	0.1:1	0.2:1
One M per no. F	0	1:9.3	1:0.3	1:1.0	1:9.6	1:1.9	1:9.7	1:4.4
White marlin								
No. of M:no. of F	13:15	21:41	6:11	4:6	20:37	3:18	8:12	75:140
No. of M per one F	0.9:1	0.5:1	0.5:1	0.7:1	0.5:1	0.2:1	0.7:1	0.5:1
One M per no. F	1:1.2	1:2.0	1:1.8	1:1.5	1:1.8	1:6.0	1:1.5	1:1.9
Sailfish								
No. of M:no. of F	0:4	4:10	2:7	4:2	1:4	0:1	16:43	27:71
No. of M per one F	0	0.4:1	0.3:1	2.0:1	0.2:1	0	0.4:1	0.4:1
One M per no. F	0	1:2.5	1:3.5	1:0.5	1:4.0	0	1:2.7	1:2.6

Table 4.--Billfishes hooked-per-hour-of-trolling and hours trolled to hook a fish in the northern Gulf of Mexico, 1978.

	Sampled hours trolled	Fish hooked-per-hour-of-trolling and hours trolled to hook one fish ( )			
		Blue M.	White M.	Sailfish	All Billfish
		- - - - - - - - Number - - - - - - - - - -			
Northeastern Gulf	14,073.2	0.023 (43.6)	0.046 (21.7)	0.011 (93.2)	0.080 (12.5)
Panama City	1,093.4	0.016 (64.3)	0.069 (14.6)	0.014 (72.9)	0.098 (10.2)
Destin	7,087.6	0.022 (45.1)	0.049 (20.3)	0.014 (73.1)	0.085 (11.7)
Pensacola	3,452.5	0.018 (55.7)	0.026 (38.4)	0.007 (138.1)	0.052 (19.1)
Orange Beach	2,439.7	0.036 (28.0)	0.055 (18.3)	0.006 (174.3)	0.096 (10.4)
Northcentral Gulf	11,233.8	0.020 (51.1)	0.013 (79.1)	0.001 (1,604.8)	0.033 (30.4)
South Pass	6,678.8	0.023 (43.1)	0.016 (61.8)	0.001 (1,335.8)	0.040 (24.9)
Grand Isle	4,555.0	0.014 (70.1)	0.007 (134.0)	0.000 (2,277.5)	0.022 (45.1)
Northwestern Gulf					
Port Aransas	6,035.9	0.020 (49.1)	0.008 (128.4)	0.024 (42.5)	0.052 (19.2)
All three areas	31,342.9	0.021 (47.1)	0.027 (37.4)	0.010 (104.5)	0.058 (17.3)

Table 5.--Hours trolled and billfishes raised, hooked, and boated/released in the northern Gulf of Mexico, 1978.

	Hours trolled	Blue marlin			White marlin			Sailfish			Unidentified billfish	
		R	H	B	R	H	B	R	H	B	R	H
		Number										
Northeastern Gulf	14,073.2	465	323	115	1,189	648	378	280	151	101	68	4
Panama City	1,093.4	30	17	8	142	75	51	28	15	10	0	0
Destin	7,087.6	220	157	52	643	350	222	171	97	72	10	0
Pensacola	3,452.5	94	62	18	137	90	36	41	25	11	33	4
Orange Beach	2,439.7	121	87	37	267	133	69	40	14	8	25	0
Northcentral Gulf	11,233.8	431	220	94	305	142	95	13	7	7	2	0
South Pass	6,678.8	337	155	66	238	108	72	6	5	5	2	0
Grand Isle	4,555.0	94	65	28	67	34	23	7	2	2	0	0
Northwestern Gulf												
Port Aransas	6,035.9	213	123	62	56	47	27	167	142	77	40	2
All three areas	31,342.9	1,109	666	271	1,550	837	500	460	300	185	110	6
% of raised			60.1	24.4		54.0	32.3		65.2	40.2		5.5
% of hooked				40.7			59.7			61.7		

R = Raised.
H = Hooked.
B = Boated/released.

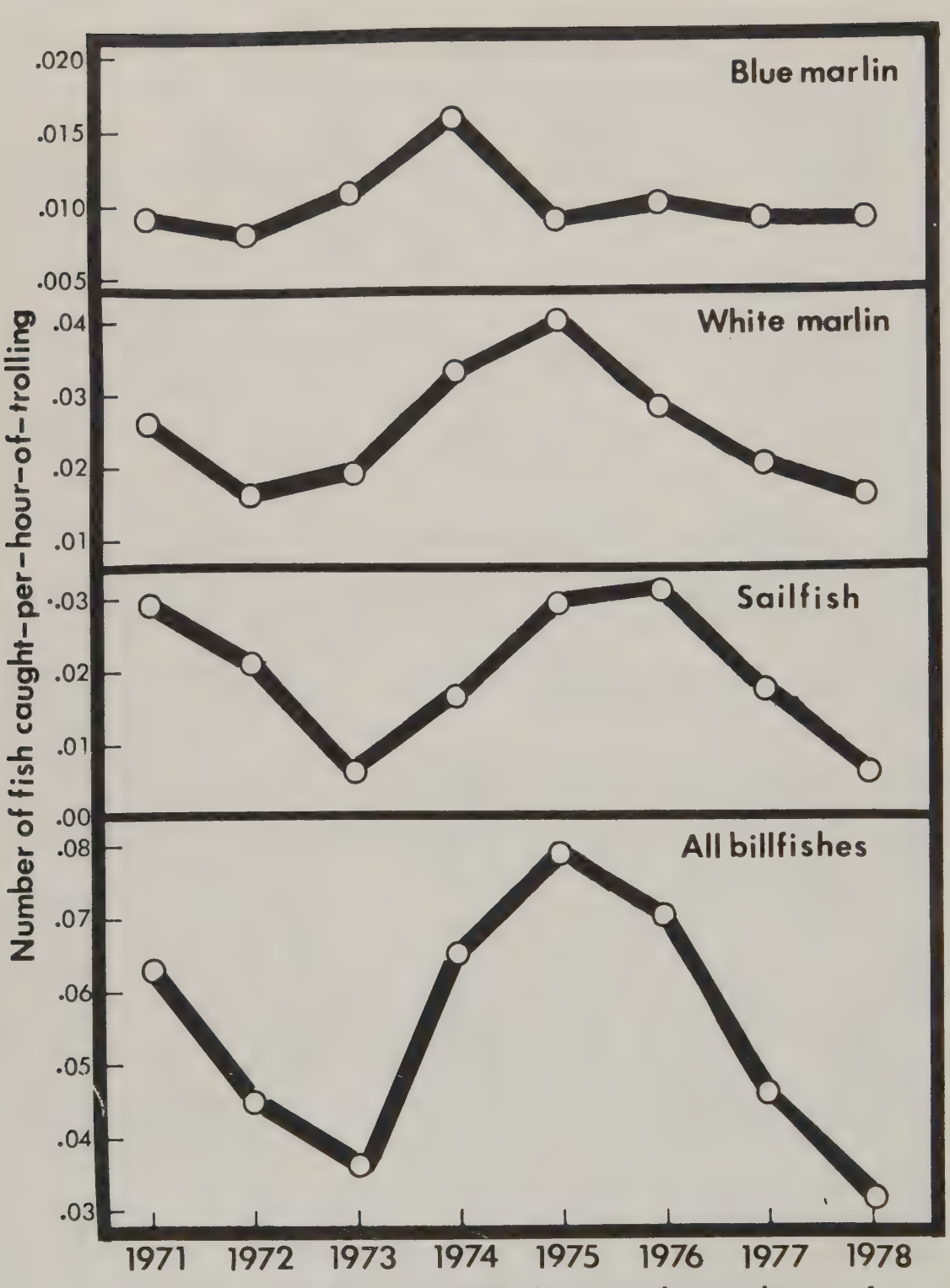


Figure 1.--Number of billfishes caught-per-hour-of-trolling in the northern Gulf of Mexico, 1971-78.

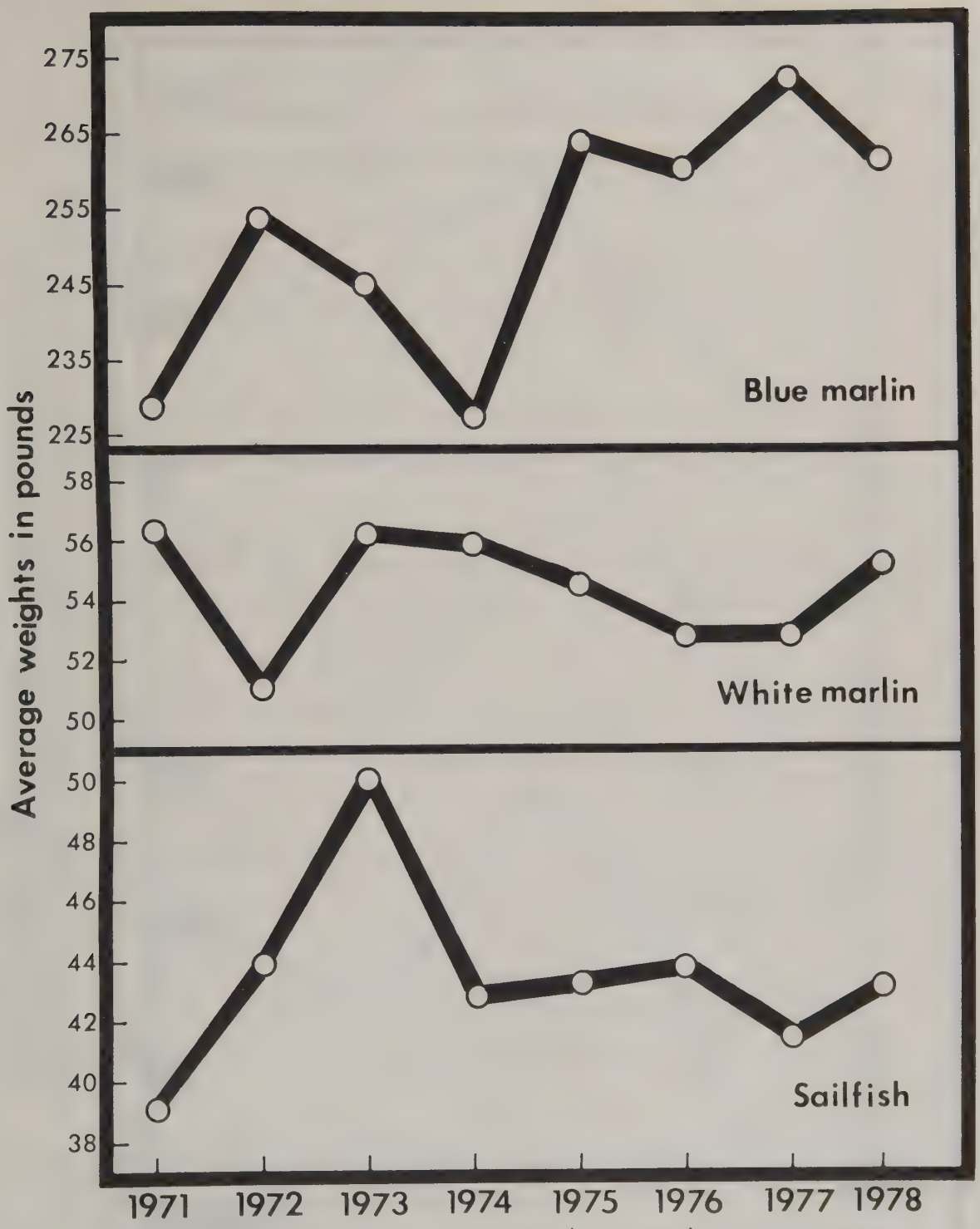


Figure 2.-- Average weights (pounds) of billfishes in the northern Gulf of Mexico, 1971-78.

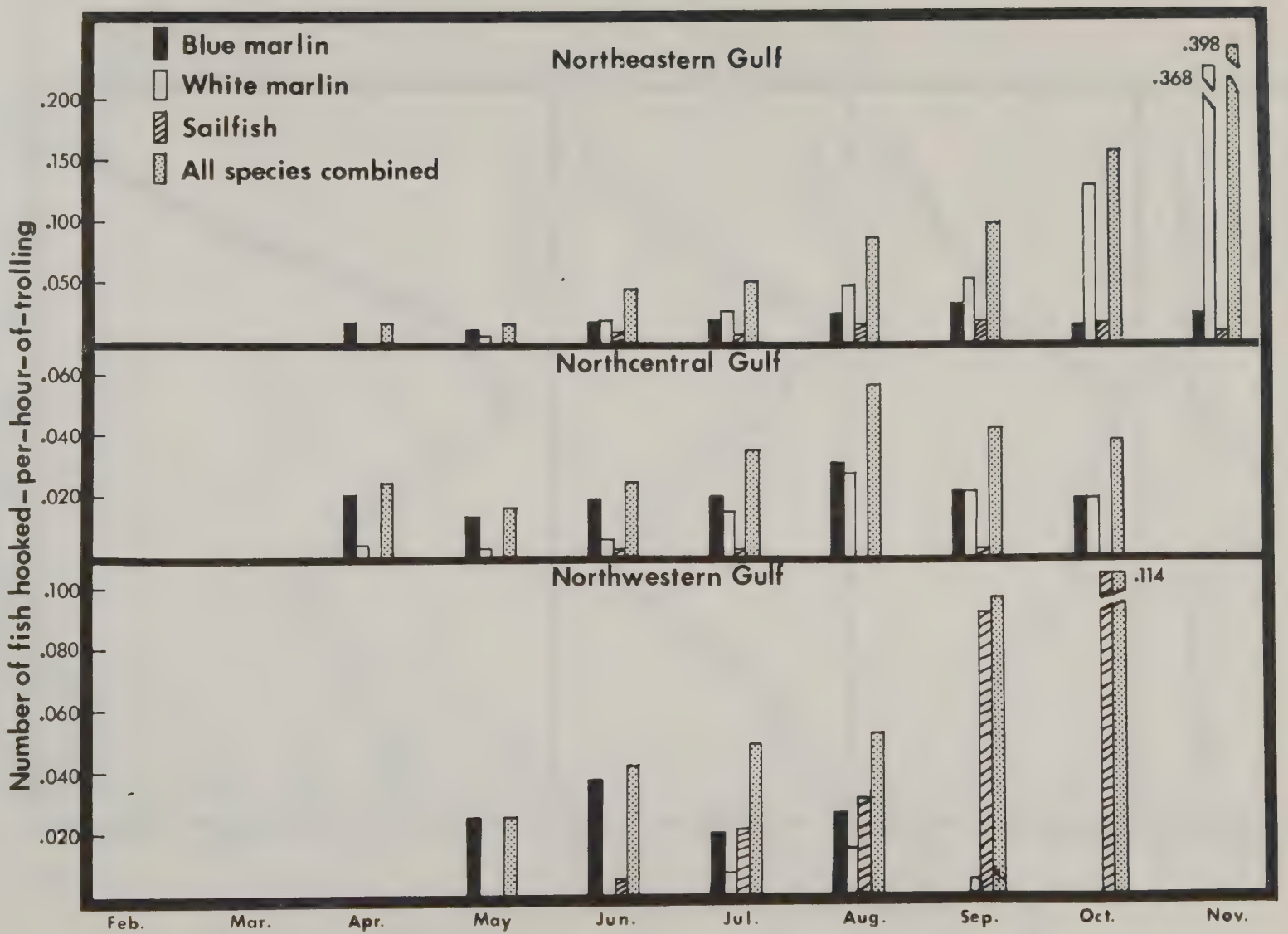


Figure 5.--Number of billfishes hooked-per-hour-of-trolling by monthly periods in the northern Gulf of Mexico, 1978.

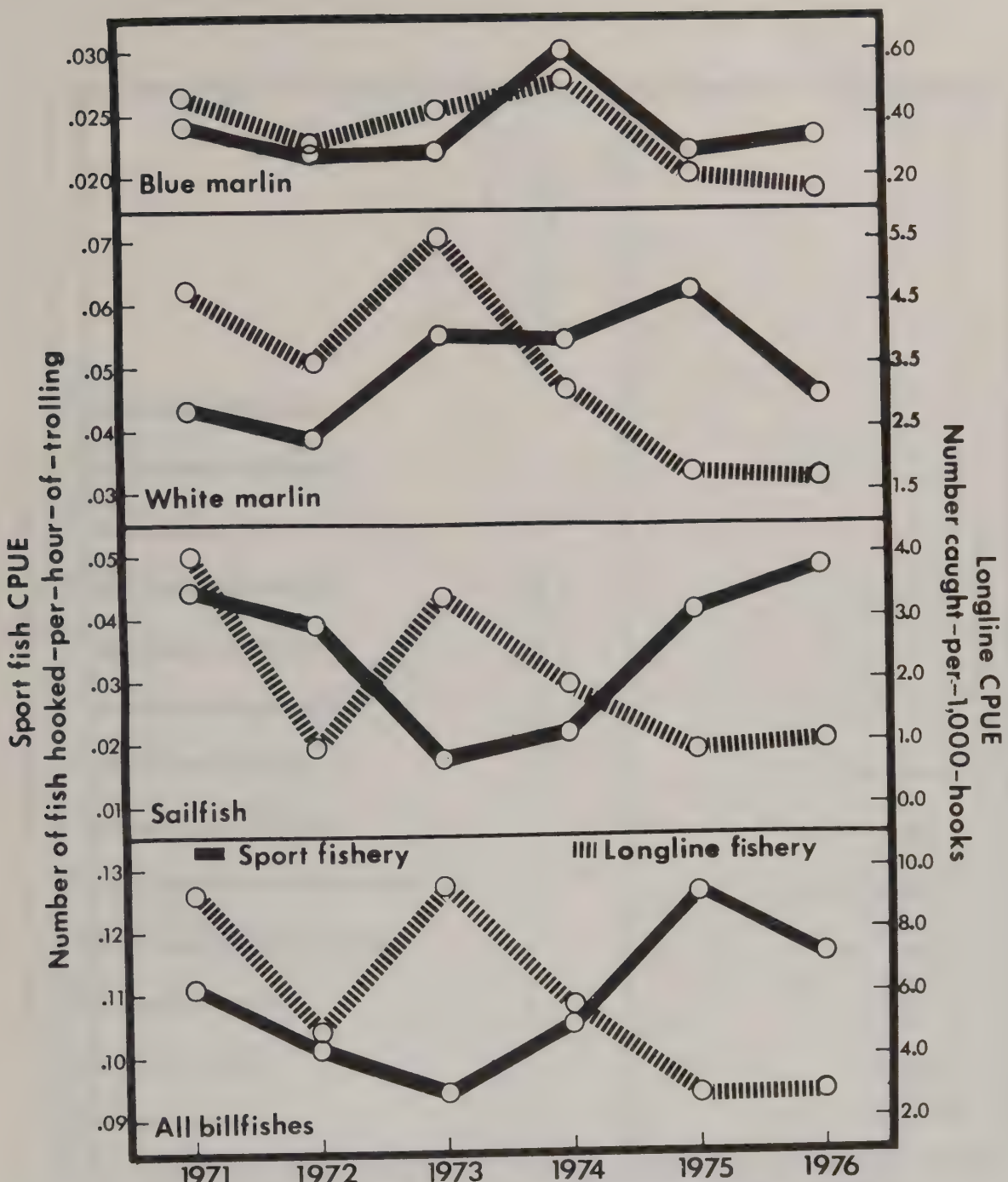


Figure 6.-- U.S. sport fishery and Japanese longline fishery catch-per-unit-of-effort between 25-30° N. latitude and 85-100° W. longitude, 1971-76.

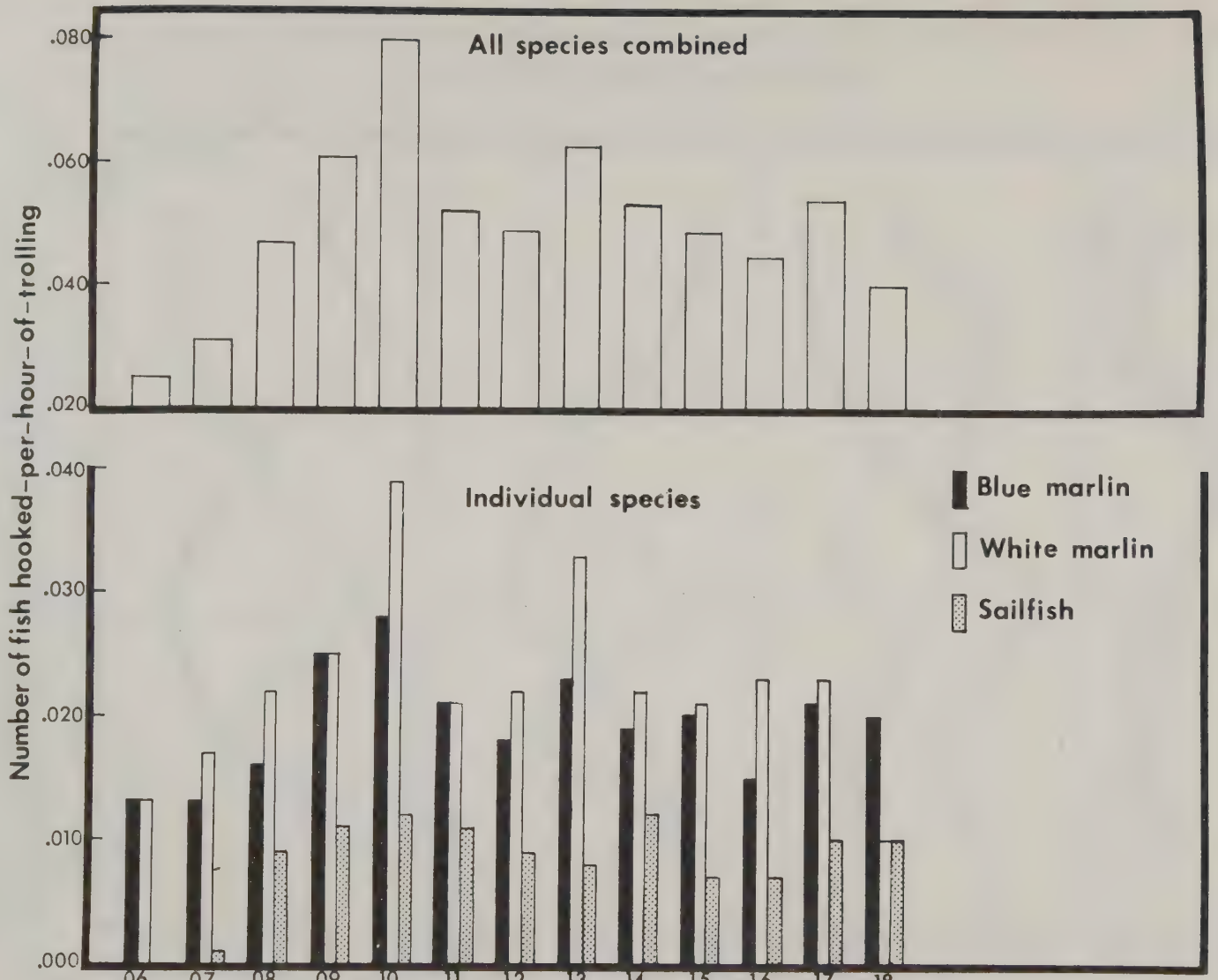


Figure 7.--Number of billfishes hooked-per-hour-of-trolling by time of day in the northern Gulf of Mexico, 1978.

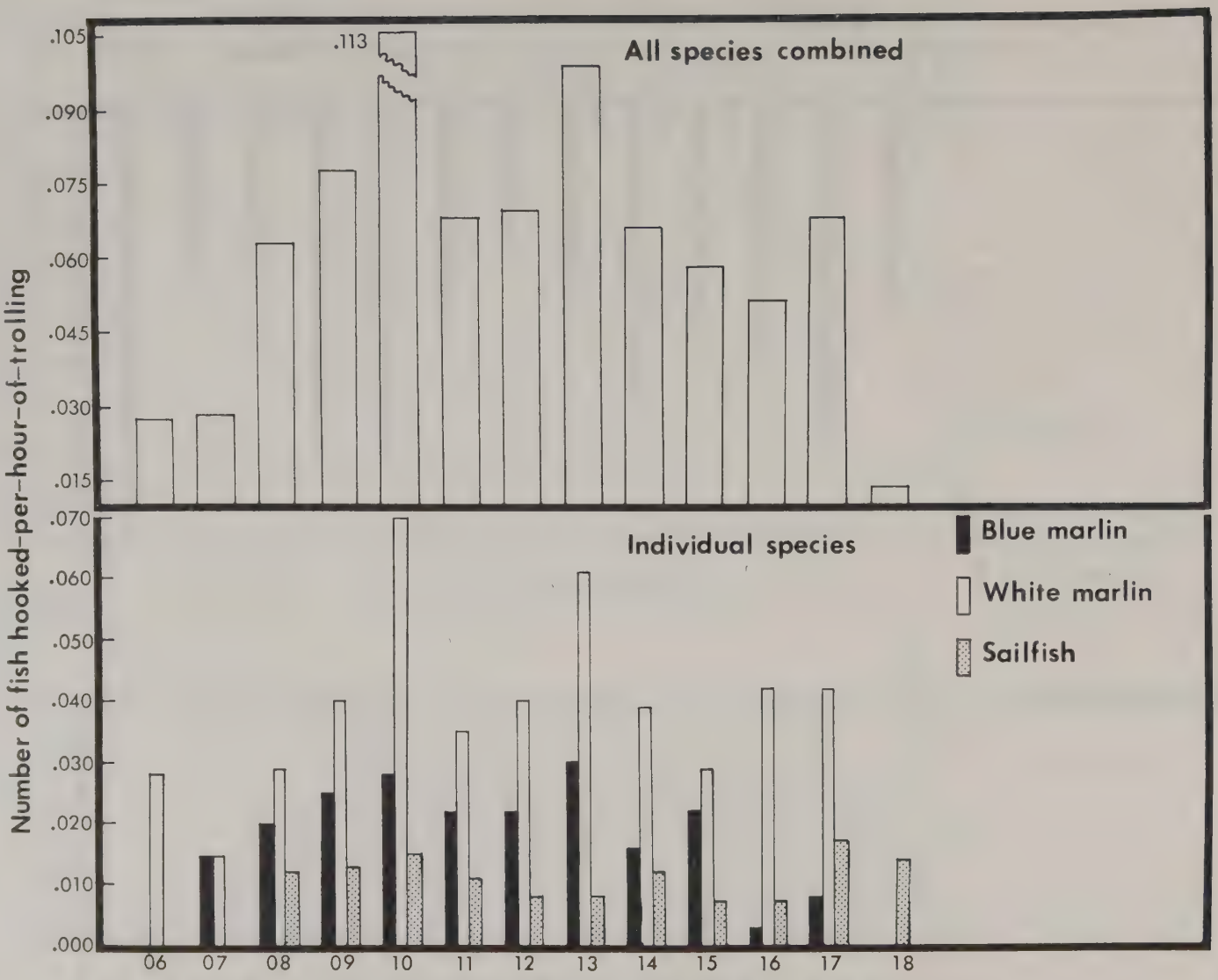


Figure 8.--Number of billfishes hooked-per-hour-of-trolling by time of day in the northeastern Gulf of Mexico, 1978.

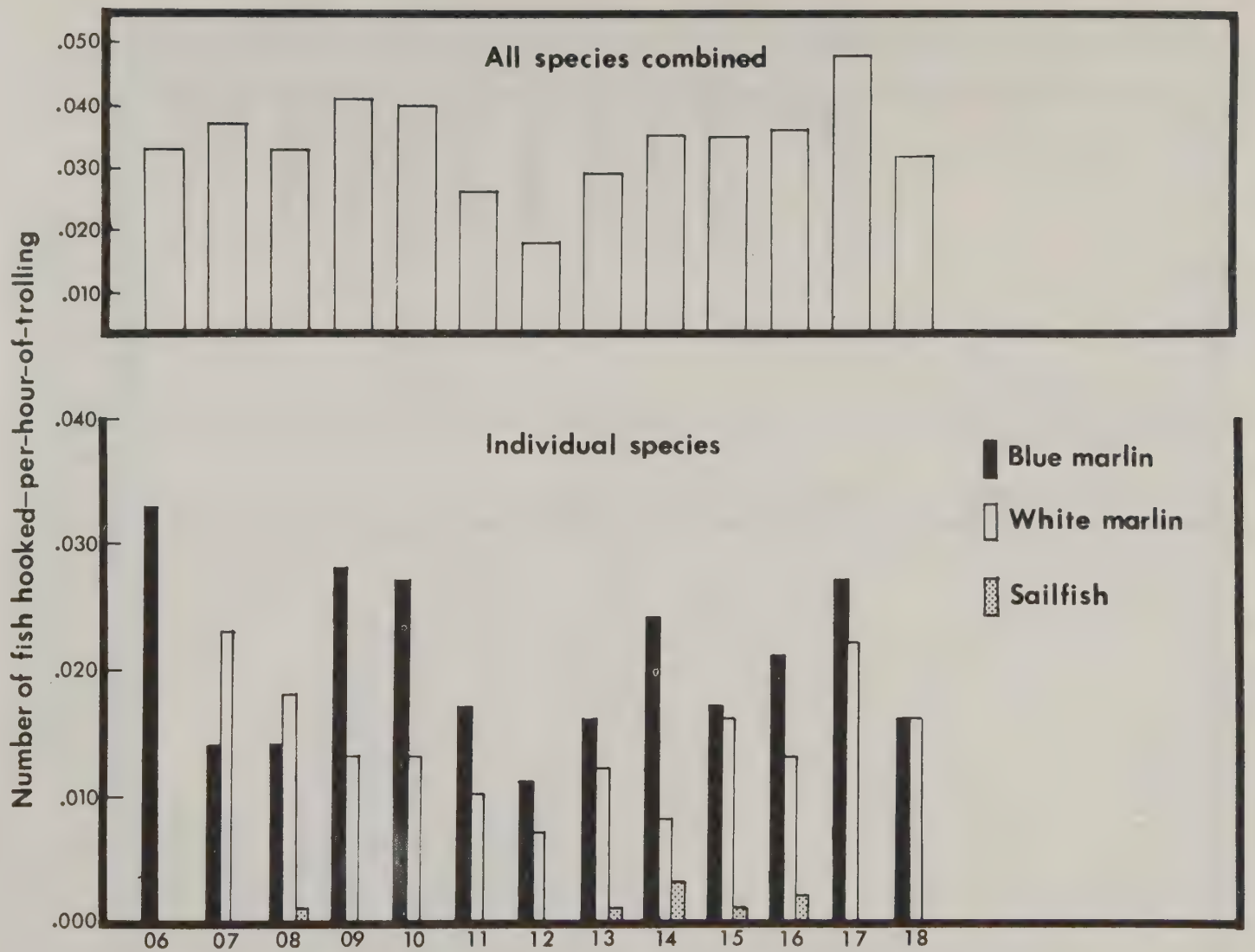


Figure 9.--Number of billfishes hooked-per-hour-of-trolling by time of day in the northcentral Gulf of Mexico, 1978.

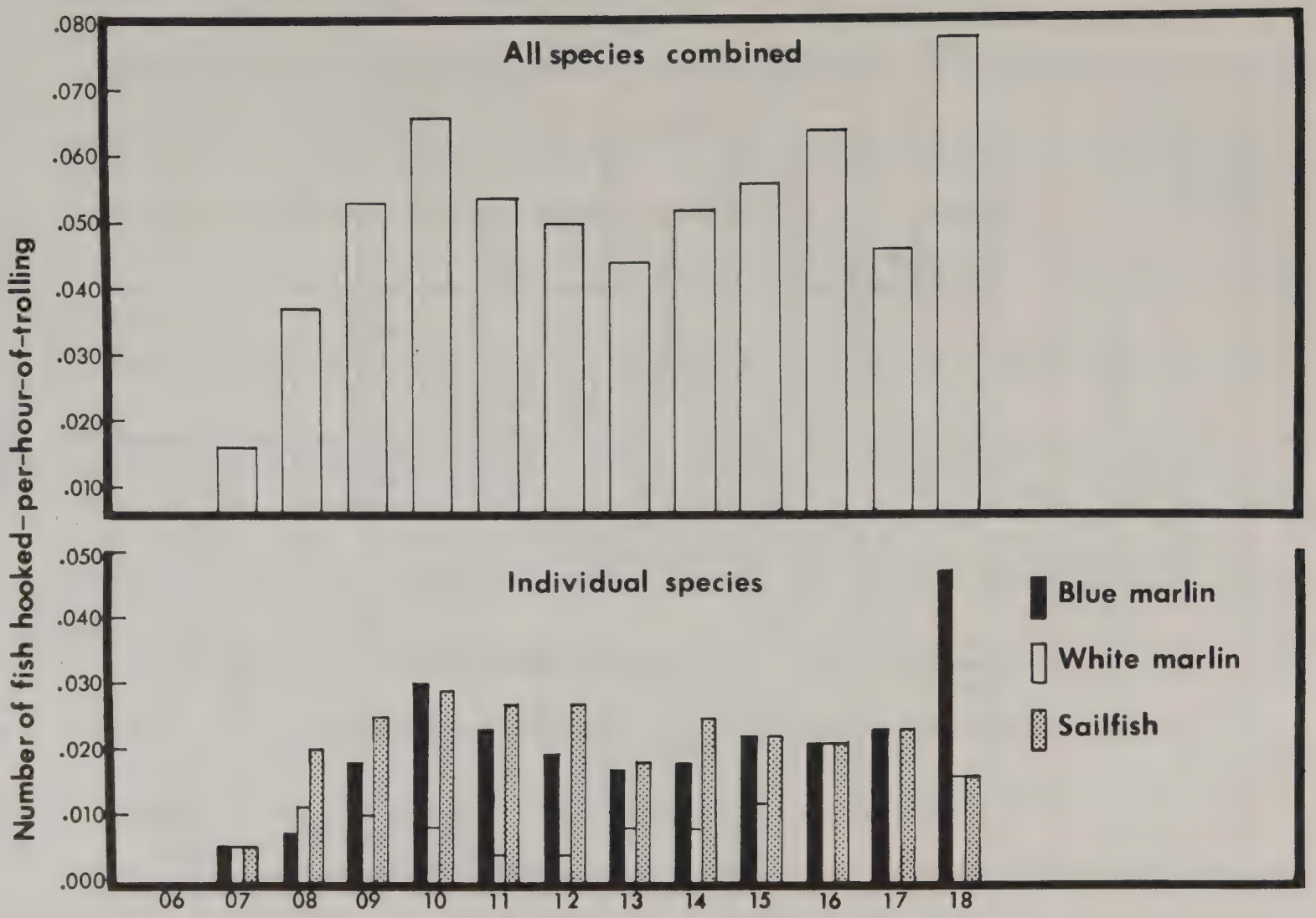


Figure 10.--Number of billfishes hooked-per-hour-of-trolling by time of day in the northwestern Gulf of Mexico, 1978.

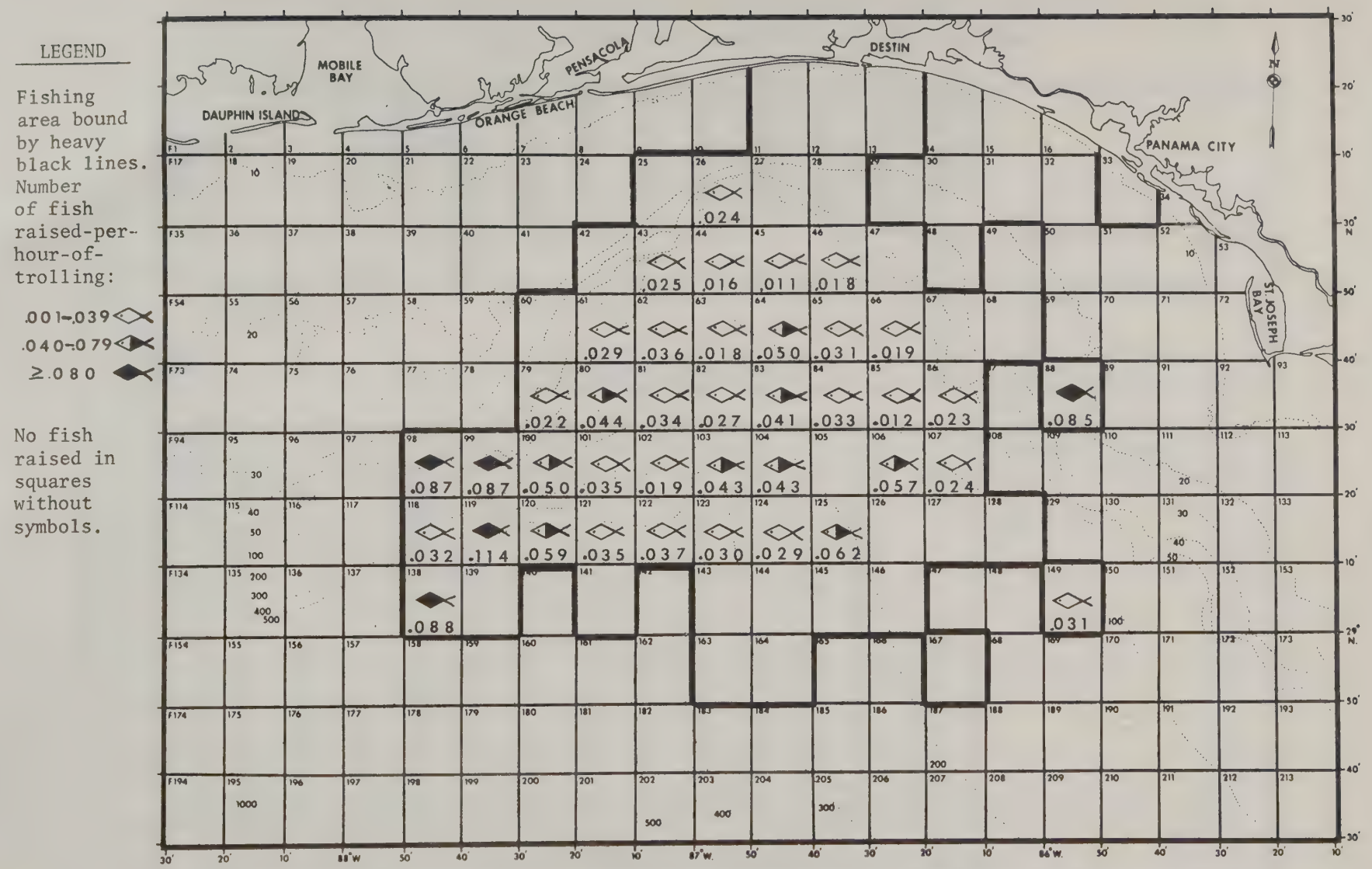


CHART 1.--Number of blue marlin raised-per-hour-of-trolling in the northeastern Gulf of Mexico by 10-min squares, 1978.

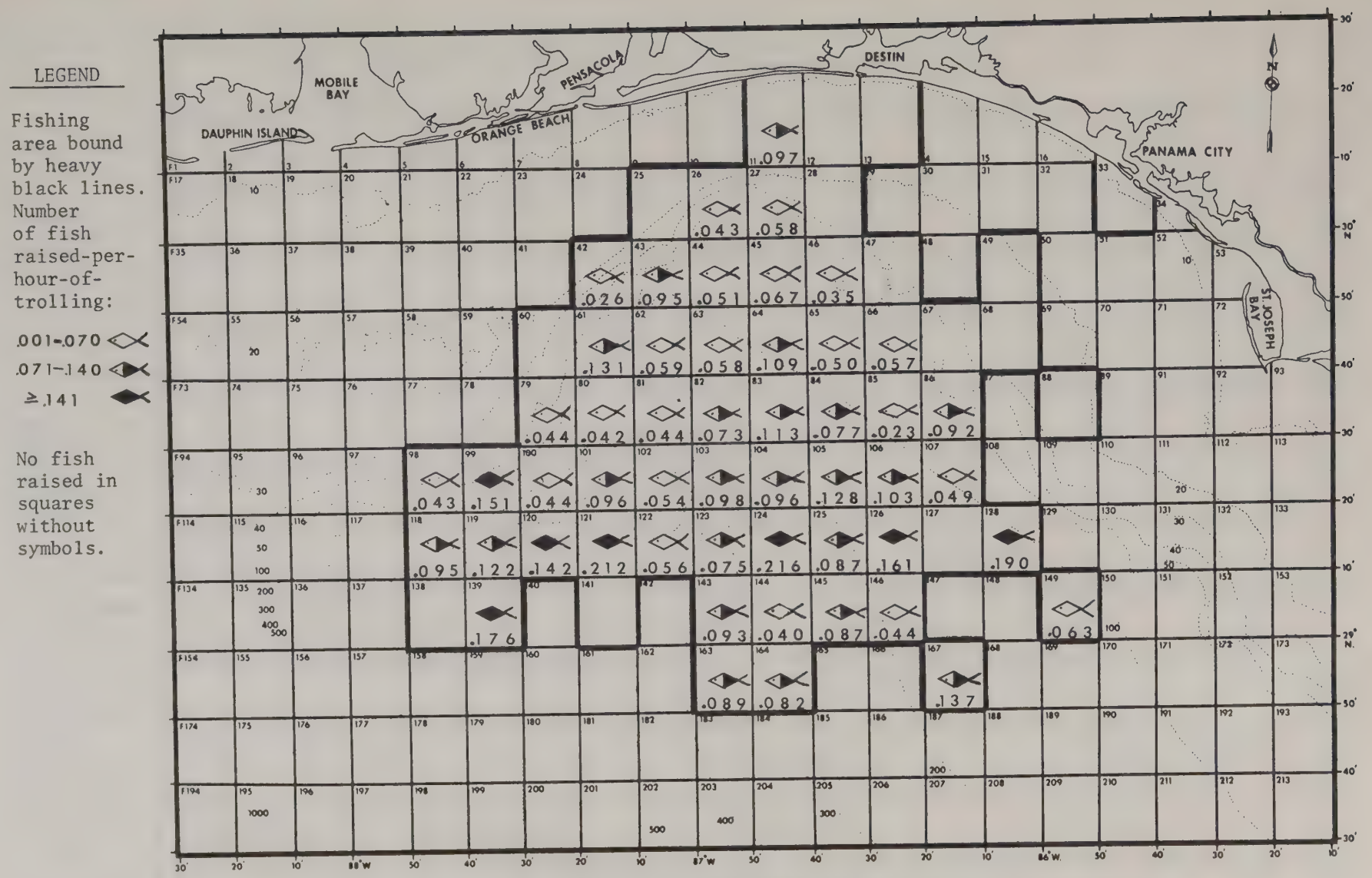


CHART 2.--Number of white marlin raised-per-hour-of-trolling in the northeastern Gulf of Mexico by 10-min squares, 1978.

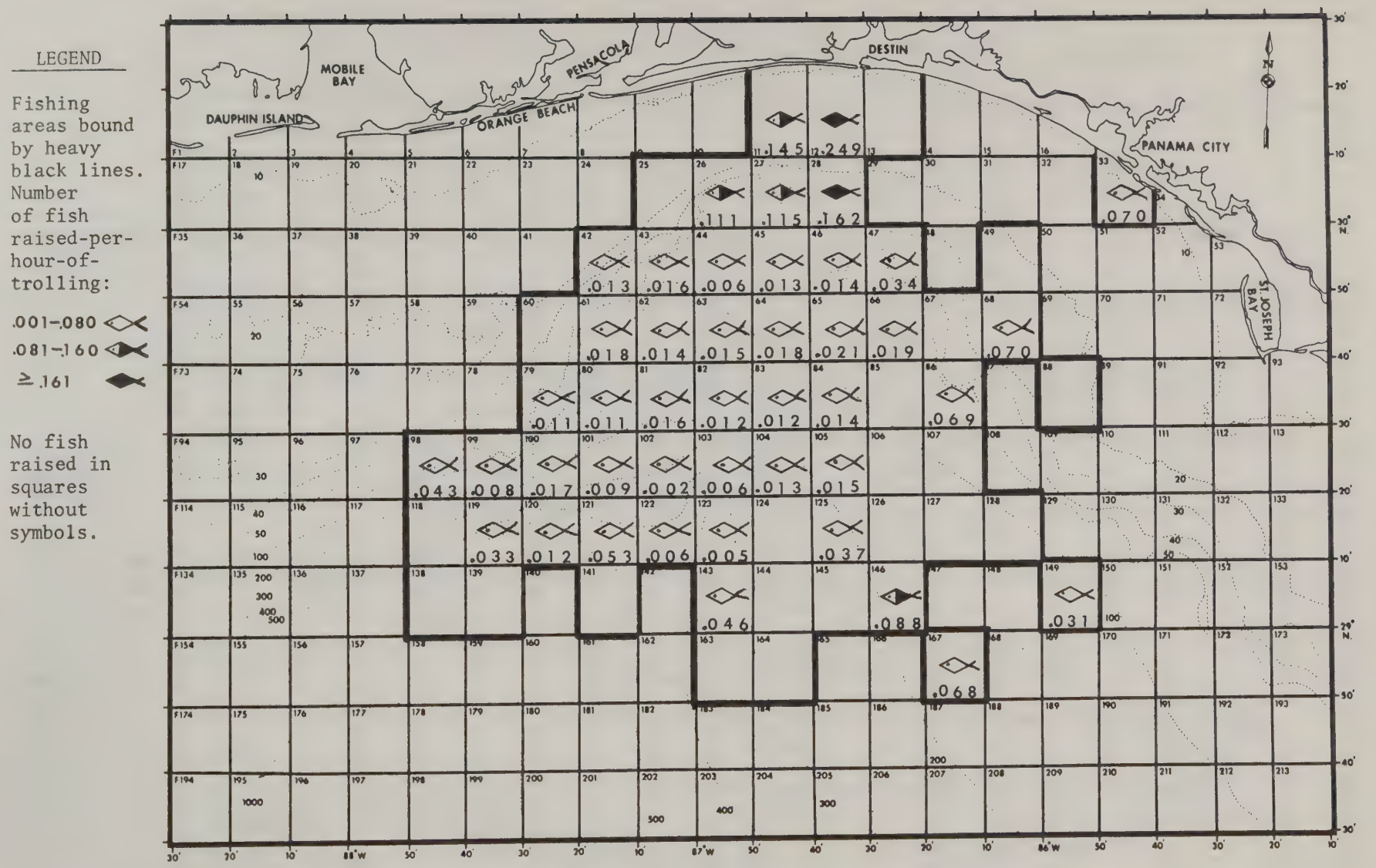


CHART 3.--Number of sailfish raised-per-hour-of-trolling in the northeastern Gulf of Mexico by 10-min squares, 1978.

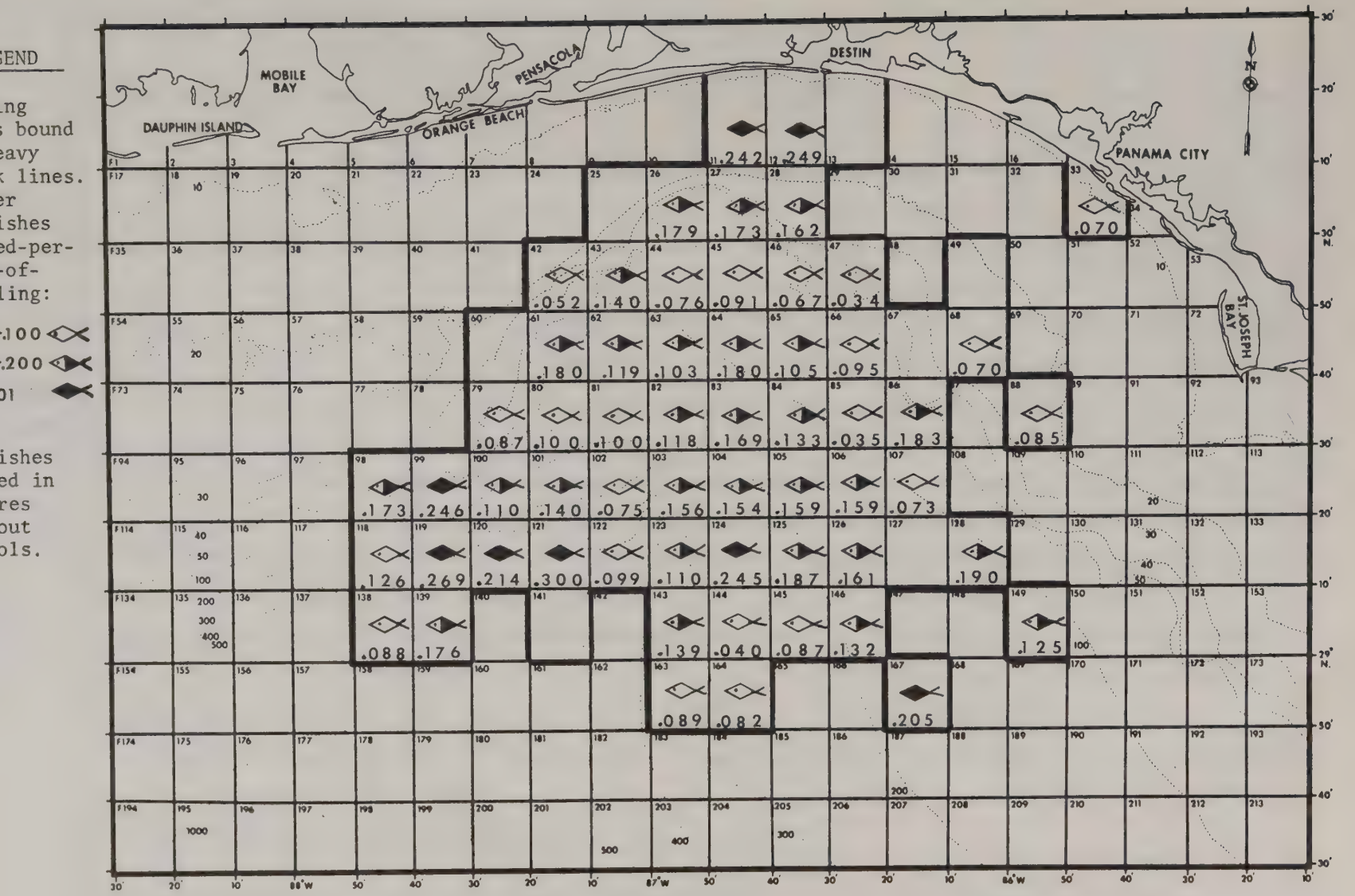


CHART 4.--Number of billfishes raised-per-hour-of-trolling in the northeastern Gulf of Mexico by 10-min squares, 1978.

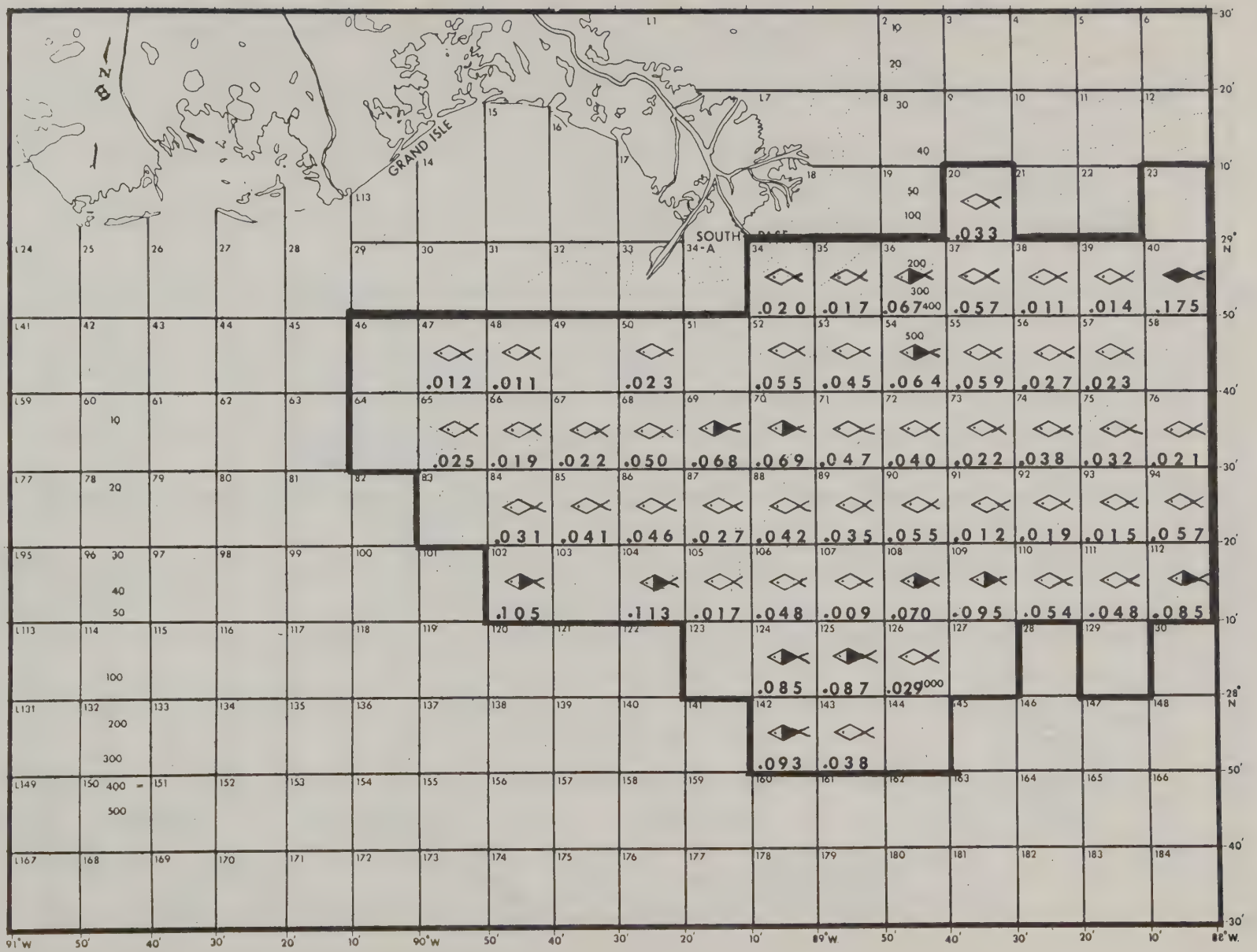


CHART 5.--Number of blue marlin raised-per-hour-of-trolling in the northcentral Gulf of Mexico by 10-min squares, 1978.

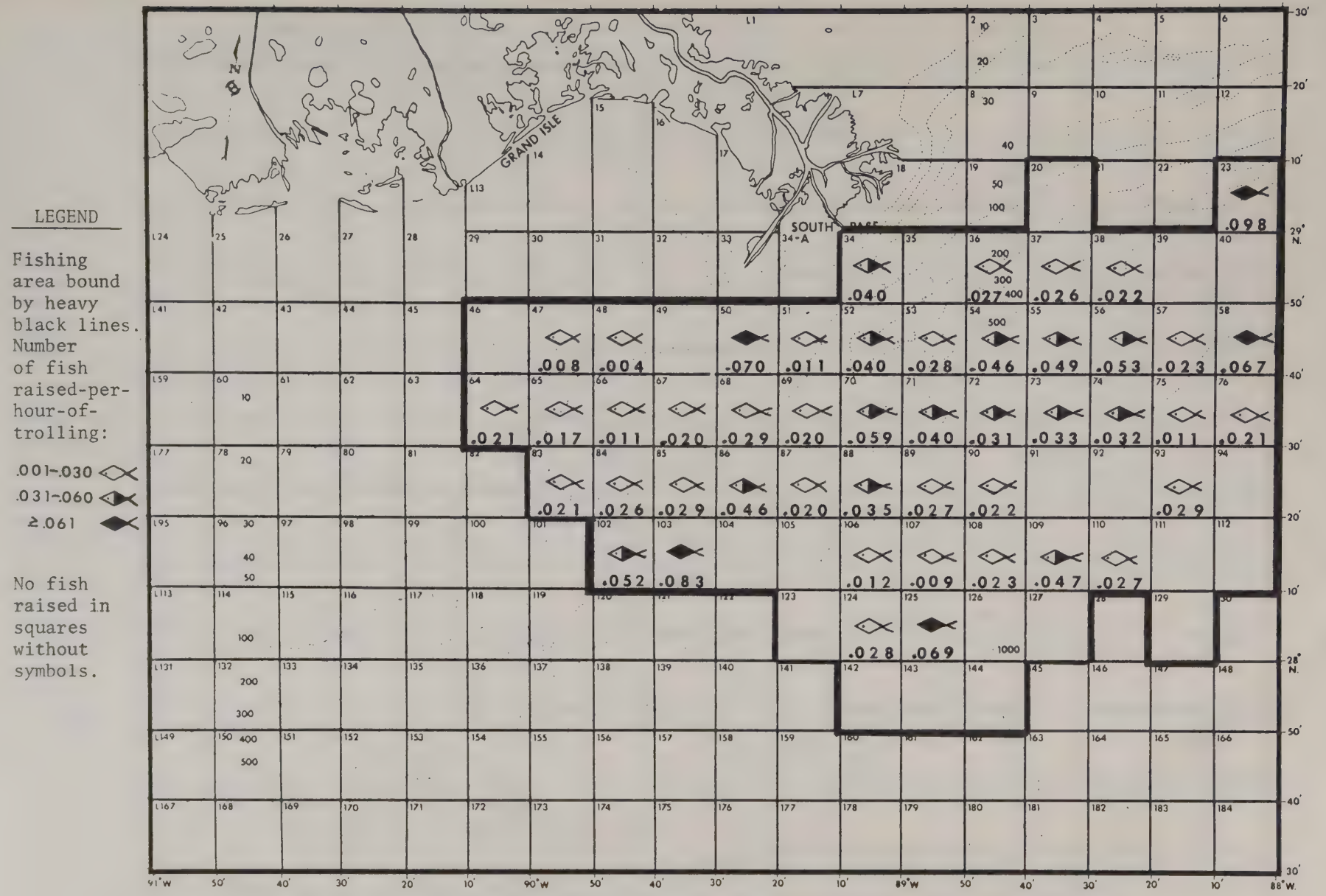


CHART 6.--Number of white marlin raised-per-hour-of-trolling in the northcentral Gulf of Mexico by 10-min squares, 1978.

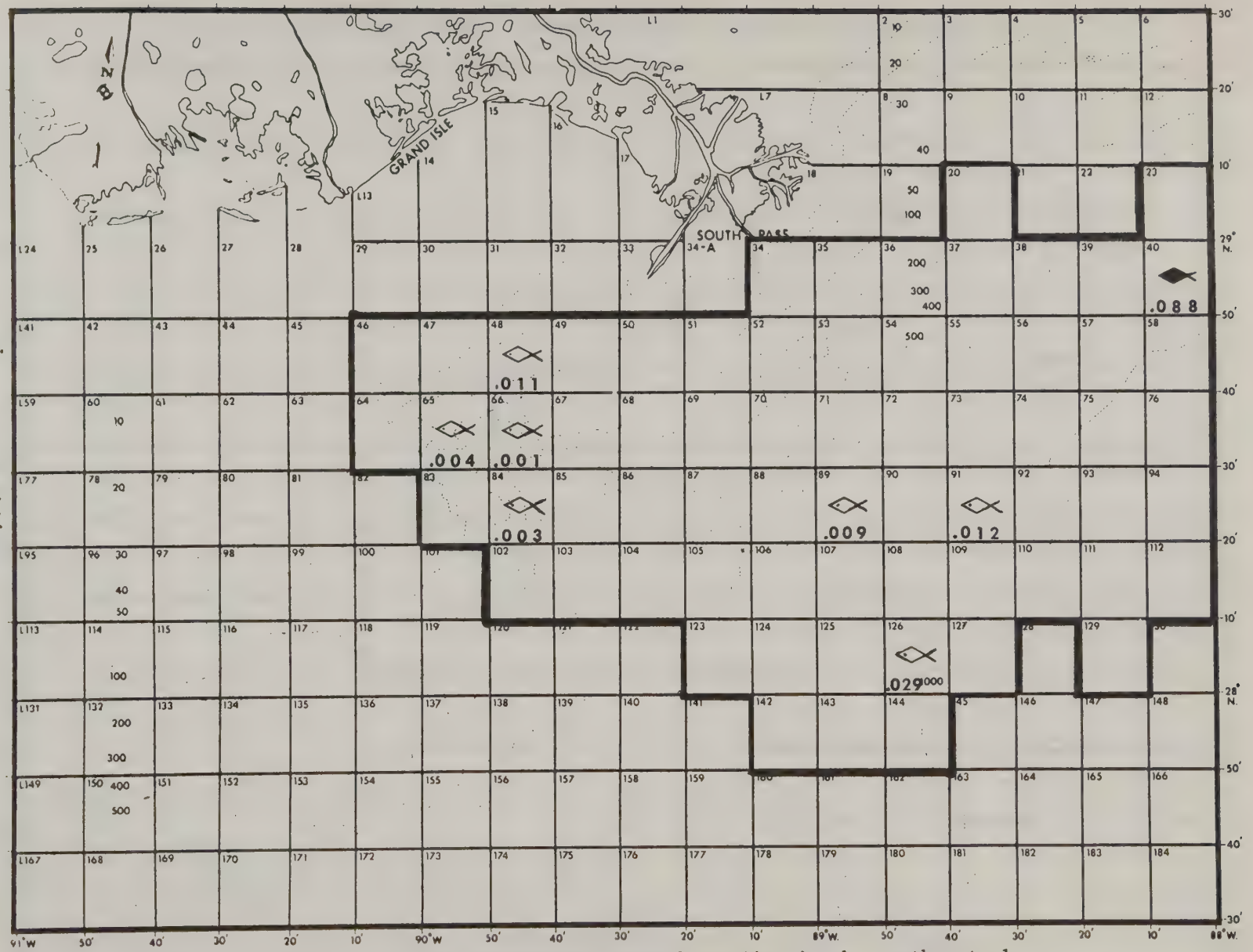


CHART 7.--Number of sailfish raised-per-hour-of-trolling in the northcentral Gulf of Mexico by 10-min squares, 1978.

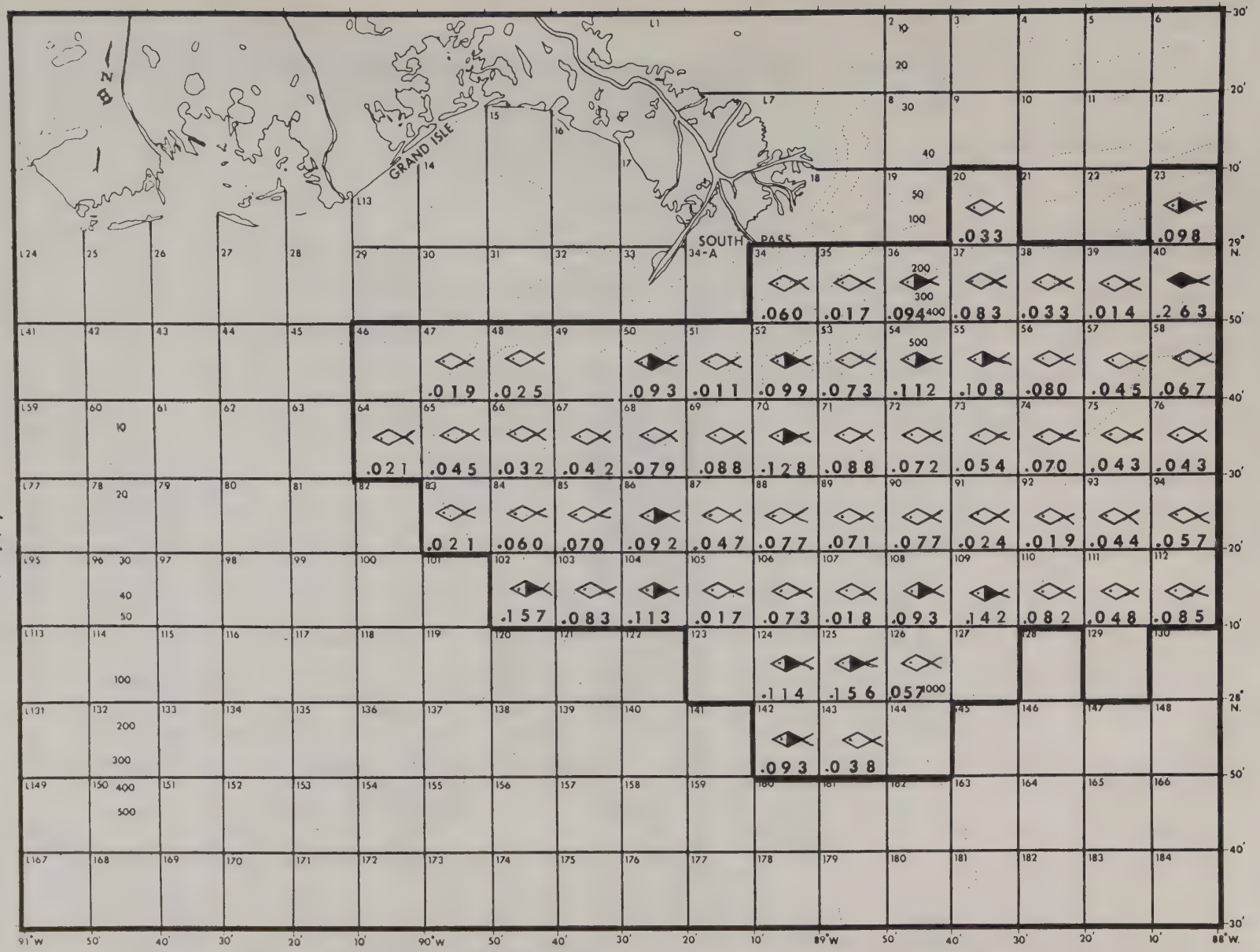
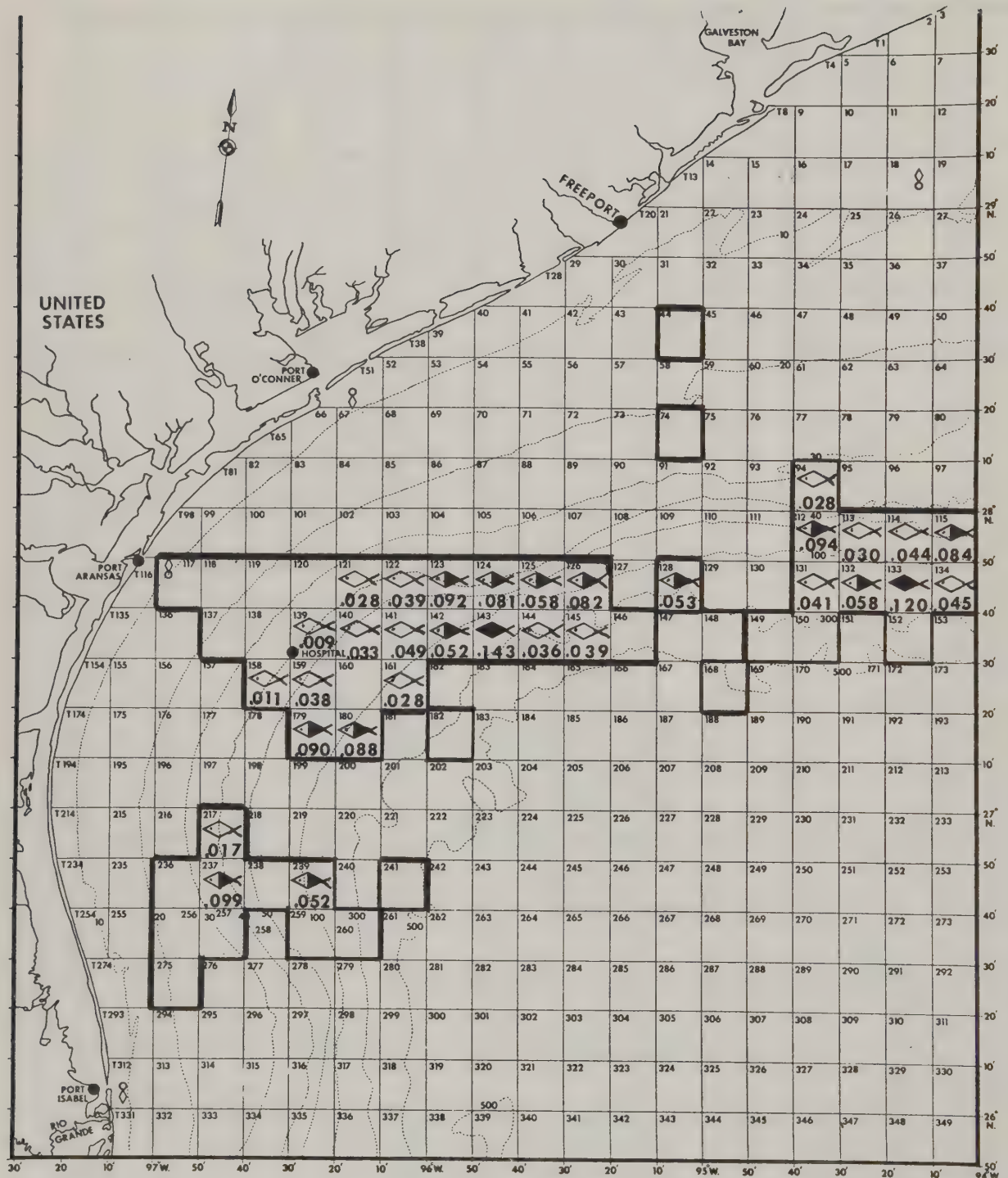
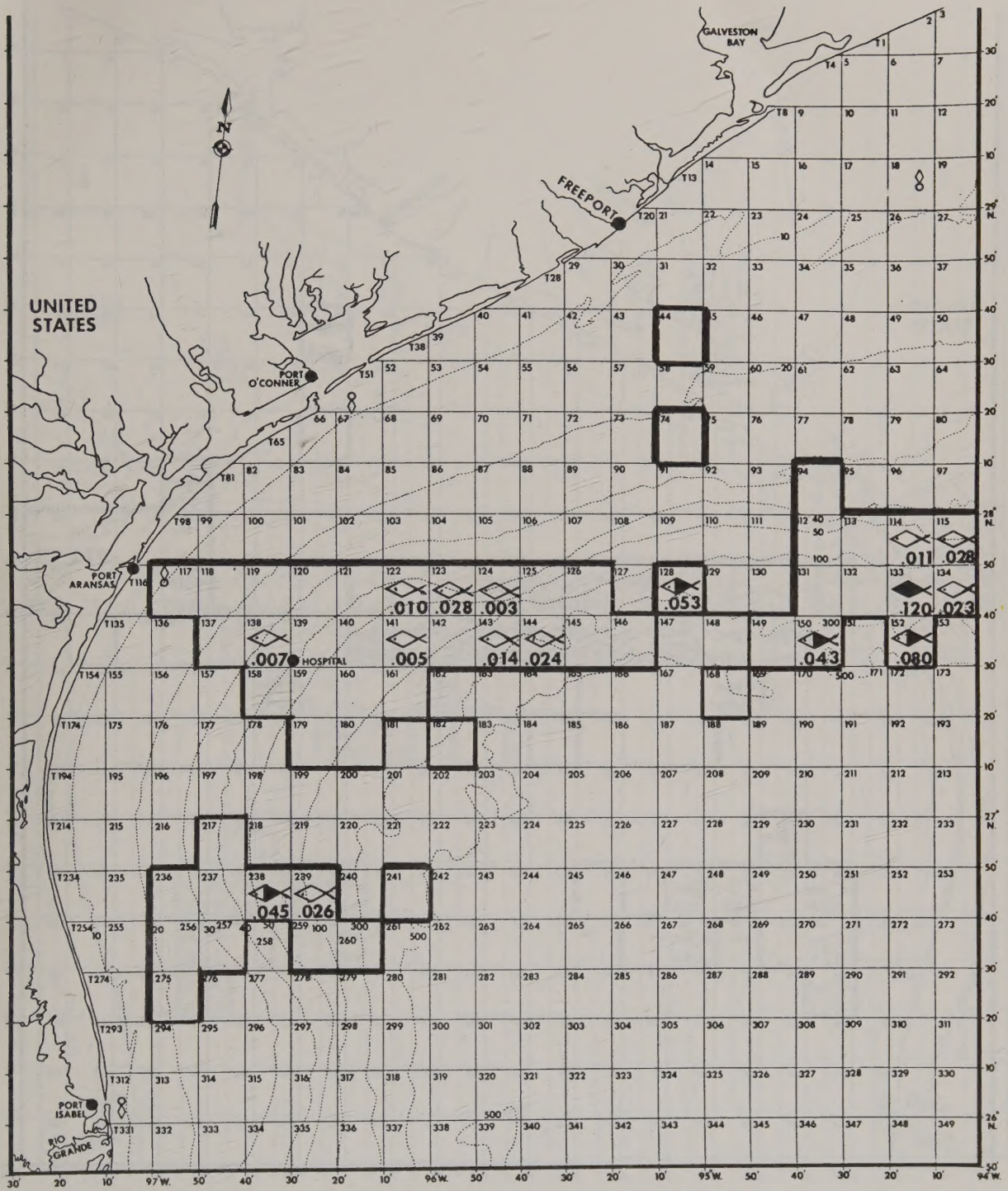


CHART 8.--Number of billfishes raised-per-hour-of-trolling in the northcentral Gulf of Mexico by 10-min squares, 1978.



LEGEND	Fishing areas bound by heavy black lines. No fish raised in squares without symbols.	.001 – .049	fish raised-per-hour-of-trolling.
		.050 – .099	fish raised-per-hour-of-trolling.
		≥ .100	fish raised-per-hour-of-trolling.

CHART 9.--Number of blue marlin raised-per-hour-of-trolling in the northwestern Gulf of Mexico by 10-min squares, 1978.



L E G E N D

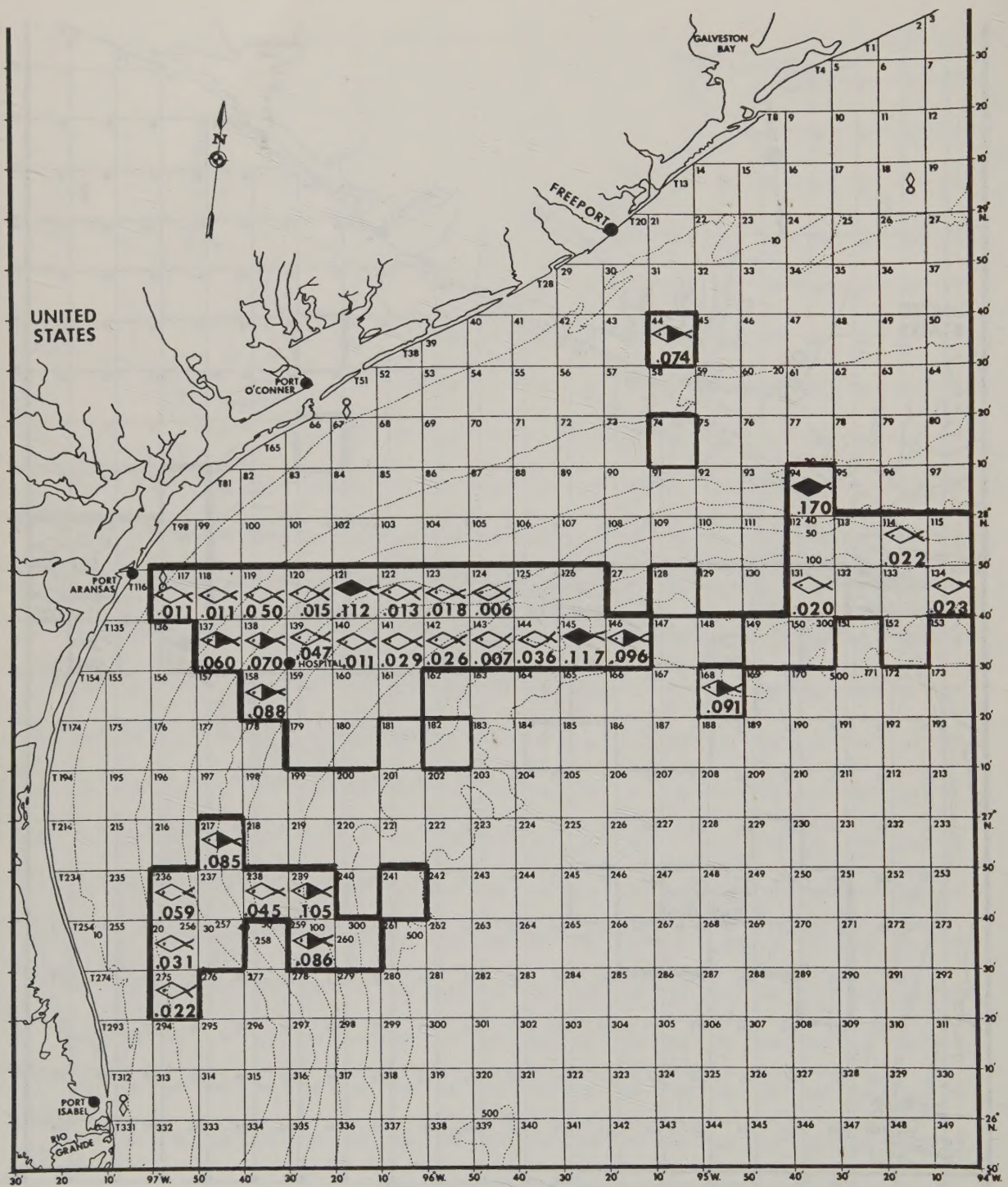
Fishing areas bound by heavy black lines. No fish raised in squares without symbols.

.001 — .040 fish raised-per-hour-of-trolling.

.041 — .080 fish raised-per-hour-of-trolling.

≥.081 fish raised-per-hour-of-trolling.

CHART 10.--Number of white marlin raised-per-hour-of-trolling in the northwestern Gulf of Mexico by 10-min squares, 1978.



L E G E N D

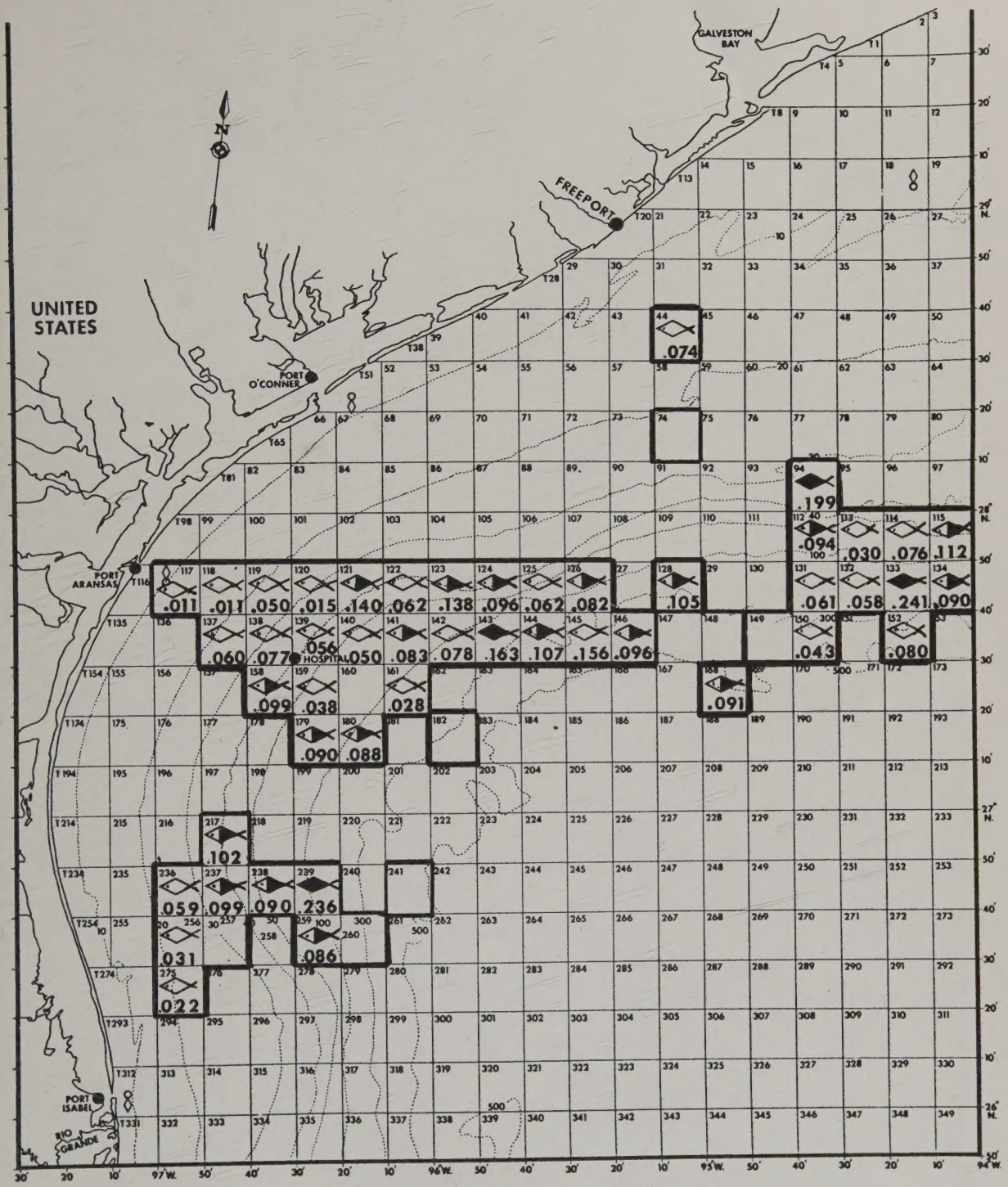
Fishing areas bound by heavy black lines. No fish raised in squares without symbols.

.001—.055 fish raised-per-hour-of-trolling.

.056—.110 fish raised-per-hour-of-trolling.

≥.111 fish raised-per-hour-of-trolling.

CHART 11.--Number of sailfish raised-per-hour-of-trolling in the northwestern Gulf of Mexico by 10-min squares, 1978.



L	Fishing areas	.001— .080	fishes raised-per-hour-of-trolling.
E	bound by heavy	.081— .160	fishes raised-per-hour-of-trolling.
G	black lines.	≥.161	fishes raised-per-hour-of-trolling.
E	No fish raised		
N	in squares		
D	without symbols.		

CHART 12.--Number of billfishes raised-per-hour-of-trolling in the northwestern Gulf of Mexico by 10-min squares, 1978.